

TABLE OF CONTENTS

CONSTRUCTION - EARTHWORK

Chapter 1	Areas of discussion	1 - 1
Course Overview	* Right-of-way preparation	
	* Excavation and embankment construction	
	* Subgrade construction	
	* Finishing	
	* Special fill and backfill	
	* Uncoated aggregate bases	
Chapter 2	Introduction	2 - 1
Right-Of-	Preliminary investigation	
Way Preparation		
	Clearing and grubbing	2 - 2
	Removal of structures and obstructions	2 - 3
	* Building and foundation removal	
	* Inspection and removal of asbestos	
	* Bridge removal	
	* Pipe and sewer removal	2 - 4
	* Pavement and miscellaneous removal	
Chapter 3	Earth materials	3 - 1
Soils		
Identification	Common excavation	
And	Borrow	
Classification	Comments	
	Rock principal types	3 - 2
	Soil horizons	3 - 3
	A-horizon	
	B-horizon	
	C-horizon	
	Soil components	
	Soil textures	3 - 4
	Field identification tests	
	* Sands and gravels	3 - 6
	* Marl, muck, and peat	
	Summary	3 - 7

	Method of field classification for Indiana soils	3 - 7
	* Modifiers	
	* Classification of soils	3 - 9
Chapter 4	Introduction	4 - 1
Excavation	Common excavation	
	Submitting samples	
	* Preparing IT-530	4 - 2
	Rock excavation	
	Exploratory drilling	4 - 3
	Rock pre-splitting	
	Explosives	
	Primary blasting	
	Restrictions	
	Finished grade	4 - 4
	Unclassified excavation	
	* Waterway	
	* Class Y	
	* Class X	4 - 5
	Disposal of excavated material	4 - 5
	* Suitable material	
	* Unsuitable material	
	* Excess material	
	Borrow	
	Contractor responsibilities	4 - 6
	Preparing a borrow pit	
	Peat excavation	4 - 7
	* Excavation of peat deposits	4 - 8
	* Treatment of existing fills	
	* Treatment by removal	
	* Treatment by displacement	
	* Peat disposal	4 - 9
Chapter 5	General Preparation	5 - 1
Excavation	General requirements	5 - 2
Construction	Equipment requirements	5 - 3
Requirements	* Hauling equipment	5 - 4
	* Spreading equipment	5 - 5

	* Compacting equipment	5 - 7
Chapter 6	Introduction	6 - 1
Embankment		
Construction	Rock Embankment	
	* Lift requirements	
	* Compaction methods	6 - 2
	Shale and soft rock embankments	
	* Lift and compaction requirements	
	Embankments on hillsides and slopes	6 - 3
	Embankment over existing roads	
	Treatment of existing pavements	
	Density Control (compaction)	6 - 4
	Settlement control	
	Method of measurement	6 - 7
Chapter 7	Introduction	7 - 1
Measurement And		
Earthwork	Contract quantity payment	
Calculations	Measured quantity payment	
	Measurement and earthwork calculations	7 - 2
	Cross-sections	
	Volumes	
Chapter 8	Introduction	8 - 1
Subgrade		
Construction	Construction requirements	
	Fine grading	8 - 3
	Density testing	8 - 4
	Proofrolling	8 - 5
	Chemical modification of soils	
	Standard cut and fill sections	8 - 7
	Subgrade treatments	
	Moisture control	
	Exceptions	8 - 8

	Drainage	8 - 8
	Measurement and payment	
	Summary	
Chapter 9 Finishing	Introduction	9 - 1
	Finishing requirements	
	* Shoulders	
	* Ditches	
	* Slopes	
	* Earth graded roads	9 - 2
	Final trimming and cleaning	
	Measurement and payment	
	Summary	
Chapter 10 Special Fill And Backfill (B Borrow)	Introduction	10 - 1
	B Borrow fill and backfill	
	* Materials	
	* Flowable Mortar substitution	
	Construction requirements	10 - 2
	* Mechanical compaction	
	* Embankment for Bridges	
	* B borrow around Bents	
	* Aggregate for End Bent backfill	10 - 3
	* Unbalanced backfill	
	* Spandrel Filling	
	Method of Measurement	
	Basis of Payment	
	Flowable Mortar	10 - 4
	* Proportioning	
	* Flow	
	* Average penetration resistance	10 - 5
	* Mixing Equipment	
	* Placement	
	* Limitation of Operations	
	Method of Measurement	
	Basis of Payment	
Chapter 11 Aggregate Bases	Introduction	11 - 1
	Aggregate Base	
	* Preparation of Subgrade	
	* Temperature Limitations	

	* Spreading	11 - 1
	* Compacting	
	* Checking and correcting Base	11 - 2
	* Priming	
	Method of Measurement	
	Basis of Payment	
	Subbase	
	* Preparation of subgrade	11 - 3
	* Temperature limitations	
	* Spreading	
	* Compacting	
	(a)Aggregate separation layers	
	(b)Aggregate drainage layers	
	* Checking and coorrecting Subbase	
	Method of Measurement	
	Basis of Payment	
	Aggregate Pavements or Shoulders	11 - 4
	* Preparation of Subgrade	
	* Temperature limitations	
	* Spreading	
	* Compacting	
	* Checking and correcting Base	
	* Dust Palative	
	Method of Measurment	
	Basis of Payment	11 - 5
Chapter 12	Scope	12 - 1
Field Testing	Apparatus	
For In-Place	Cone Correction Factor	
Soil Density	Density of Calibration Sand	12 - 2
Control		
	* IT-625	12 - 4
	* IT-625b	12 - 5
	* TD 320	12 - 6
	In-place density testing	12 - 7
	* Fine grain soil	12 - 8
	* Coarse granular material	
Chapter 13-Field	Scope	13 - 1
Determination of	References	
Moisture Content	Terminology	
of Soils		
ITM No.506-01T		

ITM No.506-01T Continued	Significance and Use	13 - 1
	Apparatus	
	Sampling	
	Procedure	13 - 2
	Calculations	
	Report	
Chapter 14 Nuclear Gauge Testing	Scope	14 - 1
	The Nuclear Gauge	
	Basic Gauge Components	14 - 2
	The Source Rod	14 - 3
	Daily Standard Count	14 - 4
	* Procedure	
	* Frequency	14 - 5
	* Recording the Count	
	Daily Standard Count Graphs	14 - 6
	Backscatter Density Testing	14 - 7
	* When to use	14 - 8
	* Test Site selection	
	Direct Transmission Density Testing	
	* When to use	
	* Site selection and preparation	14 - 9
	Inconsistent readings	14 - 10
	Regular Maintenance	
	Nuclear Gauge Do's and Don'ts	14 - 11
	Field use of the Nuclear Gauge	14 - 12
Chapter 15 Family of Curves And One Point Proctor Procedures	Scope	15 - 1
	Example Problem	15 - 2
	Family of Curves	15 - 3
	Typical Moisture Density Curves	15 - 4
Appendix A Field Testing	AASHTO References	16 - 1

Appendix A  
Field Testing  
Con'td.

Sample Forms	
* Nuclear Density Tests for Soil	16 - 2
* Nuclear Density Tests for Compacted Aggregate	16 - 3
* TD-250	16 - 4
* IT-625B	16 - 5
* IT-625	16 - 6
* TD-320d	16 - 7
* AASHTO T272	16 - 8